

REMARKS

Claims 1, 2, 5 and 6 are pending in the application. Claim 2 has been amended. Claims 3 and 4 have been cancelled. New claims 5 and 6 have been added. Care has been taken to avoid the introduction of new matter. The recitation in new claims 5 and 6 is supported in original claim 2.

In the Office Action, claim 1 was rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent 5,420,433 (Oae). Claims 2-4 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent 4,220,686 (Onoguchi) in view of the article entitled "Novel high brightness miniature electron gun for high current e-beam applications" by Burstert et al. (Burstert) and further in view of U.S. Patent 5,912,096 (Hada). These rejections are respectfully traversed. Applicants respectfully request reconsideration and allowance of the claims in view of the following arguments.

Regarding the anticipation rejection of independent claim 1 based on Oae, this reference does not disclose several important features of claim 1. Oae does not disclose a minicolumn, and the Office Action does not offer any support in Oae for disclosure of the use of a minicolumn, as claimed. A minicolumn is described in the present application, for example, at paragraph 7, as having a diameter and height measured in single-digit centimeters. However, Oae teaches the use of a conventional electron beam device, not a minicolumn, and does not discuss the size of the device.

Furthermore, Oae does not disclose or suggest the claimed vacuum pump situated inside the main vacuum chamber. Despite the contentions in the Office Action to the contrary, Oae's vacuum pump 2 is not inside its main vacuum chamber 1. This is clearly seen, for example, in Fig. 1 of Oae wherein vacuum pump 2 is below and outside chamber 1, and connected to chamber 1 via a valve 2a.

The Office Action interprets the claim language “situated inside” as requiring the vacuum pump be a unitary part of the main chamber. However, there is no basis in logic or in the present disclosure for this interpretation of the claim language, given the plain meaning of the term “inside” and the lack of support for the Examiner’s contention (no support is offered for it in the Office Action). Moreover, even assuming, *arguendo*, that the Office Action’s interpretation of the claim language is valid, the vacuum pump 2 of Oae is not a “unitary part” of its vacuum chamber 1. To the contrary, Figs. 1 and 3 of Oae show vacuum pump 2 separated from chamber 1 by valve 2a. Vacuum pump 2 cannot be a unitary part of chamber 1 if valve 2a is in between them.

Thus, Oae does not anticipate independent claim 1, because it does not disclose each and every element of claim 1. In particular, Oae does not disclose a minicolumn or a vacuum pump inside a vacuum chamber. Moreover, it would not have been obvious to modify the apparatus of Oae to yield the invention of claim 1.

Consequently, claim 1 is patentable.

Regarding the obviousness rejection of independent claim 2 based on Onoguchi, Burstert and Hada, this claim has been amended to recite a plurality of minicolumns non-translatably positioned orthogonal to the stage. It would not have been obvious to modify the apparatus of Onoguchi with the minicolumns of Burstert and the load lock of Hada to yield the invention of amended claim 2, because none of the cited references discloses or suggests positioning electron beam columns orthogonal to a stage, as claimed. Neither Burstert nor Hada relate to systems with multiple electron beams. Onoguchi teaches irradiating a substrate with three electron beams that are parallel to each other (see Fig. 19), but Onoguchi does not teach or suggest that these parallel beams are orthogonal to the stage. There is nothing in Onoguchi’s specification to indicate that the three

beams B, B', B'' of Fig. 19 are orthogonal to a stage. In fact, Fig.19 appears to show that the beams B, B',B'' are *not* orthogonal to the stage.

Thus, the combination of Onoguchi, Burstert and Hada does not render the invention of amended independent claim 2 obvious, because such a combination, however made, would be missing the recited plurality of minicolumns orthogonal to a stage. Moreover, it would not have been obvious to modify any Onoguchi/Burstert/Hada combination to add this feature to yield the invention of amended claim 2.

Even assuming, *arguendo*, that Onoguchi's disclosure of irradiating a substrate with three parallel electron beams is considered to suggest that the three beams are orthogonal to the stage, Onoguchi teaches using a *single* composite electronic lens capable of generating three electron beams (see, Onoguchi, Fig. 19 and col. 6:51-66). Given this teaching of Onoguchi, one skilled in the art would not be motivated to use three *separate* minicolumns to obtain the same results. This unnecessary duplication of components would lead to a more complex and more expensive apparatus. If a skilled artisan were to combine the teachings of Onoguchi and Burstert, it is much more likely that they would employ a single minicolumn electron beam source of Burstert with a single composite electronic lens of Onoguchi, than employ the recited plurality of minicolumns to do the same job. Such an arrangement would yield the cost savings discussed in Burstert (although it would not yield the invention of amended claim 2).

Consequently, amended claim 2 is patentable.

Reconsideration and withdrawal of the rejection of claims 1 and 2 under 35 U.S.C. §§ 102 and 103 are respectfully requested.

New claims 5 and 6 are patentable by virtue of their dependency from claim 2.

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Accordingly, it is believed that all pending claims are now in condition for allowance.

Applicants therefore respectfully request an early and favorable reconsideration and allowance of this application. If there are any outstanding issues which might be resolved by an interview or an Examiner's amendment, the Examiner is invited to call Applicant's representative at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

MCDERMOTT WILL & EMERY LLP

A handwritten signature in black ink that reads "Michael A. Messina". The signature is written in a cursive, flowing style.

Michael A. Messina

Registration No. 33,424

600 13th Street, N.W.
Washington, DC 20005-3096
202.756.8000 MAM:lg
Facsimile: 202.756.8087
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